

Appl. No. 10/671,461
Amendment dated: May 12, 2005
Reply to OA of: February 18, 2005

REMARKS

Applicants have amended the specification and claims to more particularly define the invention taking into consideration the outstanding Official Action. Applicants have amended the Abstract which is found at the end of this paper on a separate sheet.

The specification has been amended as required by the Examiner to correct the spelling of electrical and make other changes of for example polymer to conductive to more accurately define the invention as instructed by Applicants. Applicants have made every effort to thoroughly check the specification to correct all possible errors which have been done.

Claim 1 has been amended to more particularly define the invention. Applicants most respectfully submit that all the claims now present in the application are in full compliance with 35 U.S.C. §112 and are clearly patentable over the references of record.

The rejection of claims 1-6 under 35 U.S.C. 103 as unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Gluschenkov has been carefully considered but is most respectfully traversed.

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

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The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Applicants also most respectfully direct the Examiner's attention to MPEP § 2144.08 (page 2100-114) wherein it is stated that Office personnel should consider all rebuttal argument and evidence present by applicant and the citation of In re Soni for error in not considering evidence presented in the specification.

In the Official Action, the Examiner rejected Claims 1-6 of the present application under 35 U.S.C. 103(a) as being obvious over the Applicant's Admitted Prior Art (AAPA) in view of US Patent No. 6,838,334 (referred to "334" hereinafter).

The Examiner indicated that AAPA disclosed the step of "refilling the deep trench with another dielectric layer (14)" (see page 3 of the Official Action). However, the dielectric layer 14, that is, the oxide layer 14 described in AAPA is formed by thermal oxidizing the sidewall of the deep trench not covered by the first polysilicon, rather than "refilling". In addition, since this dielectric layer 14 is an oxide layer formed by oxidizing the sidewall of the deep trench, the oxide layer 14 is not able to fill in a gap 15 as shown in Figs. 1b and 1c.

The process of the present invention is distinguishable from AAPA. The method disclosed in the AAPA does not teach the step of refilling the deep trench with another dielectric layer. In the method of the present invention, after a portion of the dielectric layer 22 not covered by the first conductive layer 23 is removed, another dielectric layer 25, preferably of the same material as the dielectric layer 22, refills the deep trench at the sidewall of the deep trench, so as to fill in the gap between the sidewall of the deep

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trench and the first conductive layer, which gap is generated because the height of the partially removed dielectric layer 22 is lower than the top of the first conductive layer in practical process.

The method disclosed in 334 is very different from the present invention. According to the descriptions, a trench 105 is formed in a substrate 100. A first dielectric layer 125 is formed on an upper portion 120 of the trench sidewall. Then, a second dielectric layer 135 is formed on a lower portion 130 of the sidewall and bottom 115 of the trench, as shown in Fig. 1A. The trench is filled with conductive fill 155, as shown in Fig. 1B. Then the conductive fill 155 is removed a portion from the trench, as shown in Fig. 1C. In Fig. 1D, the portion of the first dielectric layer 125 not covered by the conductive fill 155 is removed. Apparently, the steps of the process in 334 are likely in a reverse order as compared with the present invention. In 334, the first dielectric layer 125 is previously formed on the upper portion 120 of the trench sidewall, then the second dielectric layer 135 is formed on the lower portion of the trench sidewall and trench bottom. The method 334 does not teach "refill a gap" in any sense. Therefore, 334 is not sufficient evidence to one of ordinary skill in the art to render the presently claimed invention obvious, even being used in conjunction with AAPA.


In conclusion, the present invention is indeed non-obvious over AAPA in view of 334 as having the distinguishable features of refilling the deep trench with the nitride layer and partially removing the same so as to properly fill in the undesirable gap, which is not suggested by the prior art. Moreover, Applicant's specification may not be used as a teaching reference to modify the reference to arrive at the claimed invention. In re Fritch, 23 USPQ 1780, 1784(Fed Cir. 1992) ("It is impermissible to engage in hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps.). Therefore the rejections should be withdrawn and a patent granted on the claims now present in the application.

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In view of the above comments and further amendments to the specification and claims, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,

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